illness and the treatments that were being provided at that time.

This was the first US telemedicine system, black and white, broadband. It operated for six years. It proved the value of tele-psychiatry and it had a very positive impact on the institution and the patients there, but when the grant ended, the project ended. The high cost of the least microwave system could not be covered by the Nebraska Department of Public Institutions budget, and of course this is a situation that continues to occur today when grants come to an end.

Through the years since that time, UNMC has been involved in other telemedicine distance leaning activities. Since 1968 we have partnered with the Veterans Administration Medical Center to support and use an interactive broadband television interconnection. We also are linked electronically with a number of other Omaha hospitals, and of course we are a part of Nebraska's NEBSAT educational satellite system, and we also use the Nebraska video conference network, land-based for those of you from Iowa who may not know that system.

With these two systems we can reach all of the major Nebraska cities clear to the western border, and we use these heavily, particularly to reach out to health professionals and our health profession students and to do

some public education as well as administrative sharing.

As Nebraska's academic health science center, UNMC is committed to support excellence in rural health care and the development of telemedicine applications. These two things are part of the strategic plan. At the present time, however, the direct patient care that we provide over our video systems is very limited. Interestingly enough, our most frequent uses are serving our transplant and lymphoma experts who consult with patients around the world.

Now, we have established partnerships, we've applied for grants, but we've not been able to secure the rather extensive funding that's required to lease transmission services, buy equipment, and cover the cost of start up and operation of a telemedicine system. The use of the video systems that we do have in place is also difficult to promote because of the limited reimbursement that's available to physicians for telemedicine services when they provide them.

Health care today more than ever is a business, and it's difficult to convince physicians to do free telemedicine consults when they can go to their offices that are full of patients that have insurance, so this is an issues that still needs to be solved.

So at the med center, we continue our funding search and we seek to be proactive in working with other

institutions and individuals that are committed to the advancement of telemedicine and the removal of some of the barriers that exist to the successful application of telemedicine.

Things do look better. There's more funding for projects and transmission costs and real progress is being made, I believe, in the provision of reimbursement for services provided for telemedicine. But again, there's a long way to go.

We do also participate in the Nebraska Information Technology Commission activity. We feel that what's happening there in collaboration with the Department of Communication in the development of a statewide infrastructure will certainly solve some of our cost problems when it comes to delivering health care to the remote site across the state of Nebraska.

So in summary, we hope to be a part -- continue to be a part of the continuing effort to overcome the remaining barriers to successful telemedicine in the state of Nebraska and to again, have some active systems in place.

I appreciate the opportunity to participate today. I have certainly gained more than I have given because the first two panels were extremely interesting. Thank you.

(Applause.)

MS. BOYLE: Donna Hammack.

MS. HAMMACK: Thank you, Anne.

I've worked with the development of the Mid-Nebraska Telemedicine network since its inception in 1994, and I thank you very much for the opportunity to share some information about it today.

We have been fortunate enough to secure some grants that have allowed us to develop that system. We have been recipients from the Office of Rural Health Policy -- and also that has now changed to the Office for the Advancement of Tele-health -- and received three-year grants in 1994 and again in 1997, so our service delivery really began in 1995.

The Mid-Nebraska Telemedicine Network actually connects ten sites at rural hospitals. Eight of those are in Nebraska and two, even though it's the Mid-Nebraska Telemedicine Network, are in Kansas. They are connected to our regional referral center, a multi-specialty acute care hospital, Good Samaritan in Kearney, and our psychiatric facility, Richard H. Young Hospital, also located in Kearney.

Nebraska sites are connected by dedicated direct connect T1 lines. Video is currently allocated at 1152 and data, 384. We have tele-radiology applications that take advantage of the 384, and this allows primary care

physicians at the remote sites to connect to radiologists at Good Samaritan Hospital. For our present situation, we use routers to split apart the video-conferencing and the tele-radiology functions. It also should perhaps be noted that Nebraska does not price fractionalized T1 service at this time.

ISDN switching is available only selectively in Nebraska and not at any of our network's remote sites, but we do use it to connect to the hub site in Kearney to the remote sites in Kansas. The ten existing sites are all equipped with standards based video-conferencing room systems that are interoperable with other telemedicine equipment out of network, and we do have the ability to dial out of network as well.

Since the beginning of operation in December of 1995, one thing that I can share about our success story is that we are one of the most active telemedicine networks in the country and we have to date completed over 4,500 patient encounters, and over 30 different specialties have been represented during those patient encounters. Half of those, interestingly, have been in mental health.

Also some of the top drivers of the system include speech pathology, orthopedics, medical oncology, diabetic education, dermatology, arthritis education, cardiology, neurology, rheumatology, enterostomal therapy,

and others. The system is also utilized for support group systems, fibromyalgia support groups and also cancer support groups, education, and administrative meetings.

To also validate the success of the network and to show you the value, I'd like to give you just a few bits of the research that we have found from our network.

Our consulting providers have expressed satisfaction with the amount of medical information rendered. None expressed dissatisfaction and they view telemedicine as a satisfying experience along all dimensions selected for the study. Referring providers were virtually unanimous. Ninety-eight percent in agreement that telemedicine improves their ability to keep patients in their local communities. They believe the regular use of telemedicine is improving quality or keeping it the same as in-person care.

Patients enjoy the convenience of telemedicine. Both travel and waiting time averaged less than 15 minutes for most. They felt the quality of their care was either the same -- 79 percent said that -- or better. An amazing 20 percent said it was better than in-person care, and they would recommend telemedicine to a member of their family.

Technology indeed allows us the opportunity to overcome barriers and neutralize distance to better serve the needs of our rural patients. Critical to the growth and

deployment of telemedicine applications is access to broadband networks. However, we do still have some challenges which are largely inherent to sparsely populated areas.

As you know, the Telecommunications Act of 1996 was set into place among other goals to provide assistance to rural health care providers in attaining access to broadband services and to assure that rural residents would have comparable services at comparable prices to those in urban areas. It also was to spur competition among telecommunication providers, and in many cases, including ours, there was not an influx or providers vying to provide services for our network. And while more populated networks may choose between various services, ours unfortunately are still somewhat limited.

Initially the program's eligible telecommunications providers were narrowly defined. The program originally excluded inter-exchange carriers that provide the links between local exchange carriers in rural areas, and it also excluded alternative local carriers such as wireless. The 14th order of reconsideration eliminated the ETC requirement allowing the crossing of LATA boundaries and an action that may promote competition and we actively support.

The LATA boundaries have proven to be a bit

cumbersome and artificially imposed, and I understand that the Nebraska Public Services Commission is now looking at that situation as well.

While the decision to allow retroactive support for 1998 to those who receive services from non-ETCs is a really positive step, many health care and telecommunication providers did not bother to apply during the required time period because of their declared ineligibility. The sole subsidy that has been received on behalf of our network is for a part of year one to date, but we are presently working to see if we can't remedy some of that with an appeal.

Complexity in the application process also needed simplification, and that process is underway to combine forms and reduce redundancy. And in our situation, Good Samaritan assists the ten other rural hospitals in that process. I do have some concern perhaps for rural hospitals who do not have someone to help them through that process.

The discounts for year three will be based on actual distance rather than tariffed or publicly available service. We are anxious to see if that will improve the payments which are still kind of pricey for many of our rural hospitals to provide.

Also, I might mention that -- I know this is set in statute. There's nothing that can be done with regulation right now, but there is still a concern about the

non-profit health providers are the only ones that are eligible for the subsidy, and many long-term care facilities which are for-profit and physicians' offices would be unable to use these services.

I appreciate the opportunity to share information about the importance of improving options for deployment of wide-band access, and I believe that this conference in itself is a sincere expression of that effort to do the very best for our rural areas, and I thank you very much for that.

(Applause.)

MS. BOYLE: Thank you, Donna.

Dr. Kienzle?

DR. KIENZLE: Ladies and Gentlemen, it is a real pleasure for me to join you this afternoon. My presentation today will be the oral equivalent of the flight of the bumblebee. I say this because I have only a few minutes to quickly summarize our experience with tele-health applications in a rural setting, and offer a few of our lessons learned after the last six years of work. Parenthetically, we have been as busy as bees.

In 1994, we were able to leverage the investment of the State of Iowa and the Iowa Communications Network to secure the first of two National Library of Medicine contracts totaling almost $14 million. This support funded

the National Laboratory for the Study of Rural Telemedicine from 1994 until just this past month. We developed a rural test-bed network to develop and study applications of potential importance to rural health care.

Ten distinct applications were developed and tested, including virtual libraries, advanced radiology, emergency room support, pediatric cardiac imaging, and consultation for patients with mental illness or disabilities. Our network linked up to 16 mostly rural hospitals using a variety of strategies including T1, DS3, ISDN, frame-relay, and pots. Detailed reports of these activities are available on our R&D website at http://telemed.medicine.uiowa.edu. I have also submitted that executive summary of our most recent NLM contract into the record of this meeting.

In March of 1997 we developed a multi-prison consultation service with the Iowa Department of Corrections to provide specialty consultation in all of nine of Iowa's prisons. We have begun -- to date we have provided almost 800 consultations in most of our existing specialties. We have begun to explore the use of telemedicine to address some of the prison's most challenging problems such as HIV, tuberculosis, and Hepatitis C, conditions that have become epidemic in most prison systems.

In January of 1998 we developed a home

telemedicine company called Resource Link of Iowa as a joint venture with a private sector company in Kansas. This has proved a wonderful application to provide home nursing to isolated elderly patients with complex and difficult to manage medical problems. The system uses pots connected to a 13 inch television and a set-top box with camera and also allows the downloading of in-home measurements such as weights, blood pressure, blood glucose, and heart sounds.

We have served well over 100 patients and usually have 50 patients on-line connected at any one time at distances up to 250 miles. In addition to enhancing their health care, we have been able to document savings in total cost of care approaching a third. Patients love the service and enjoy real and valuable relationships with their video nurses.

We have made great progress towards providing some of our services over the Internet. In one NLM project we created a community for patients with newly diagnosed diabetes. We created a special website for patients and their health care providers where information could be made available. Patients and providers could message one another, and common issues could be discussed in a threaded forum on-line.

Other activities include enhancing our institutional website by adding services like one-on-one

discussion with physicians 24 hours a day and expert chats on common medical topics. Like many tele-health systems, we have taken advantage of these networks to offer a variety of lifelong-learning opportunities like departmental grand rounds, special events, and support for adjunct faculty and students while in the community. Literally hundreds of hours of programming have been delivered to patients and providers in all corners of the state, reducing the isolation that can accompany rural life.

We have also made a number of special programs available for CME credit on the Internet. We have also gained tremendous experience with international video conferencing and commonly do programming overseas. One of our faculty members, for example, has provided residency training in his specialty to Austria on a regular basis, as well as a number of US universities lacking his particular expertise, so we have been very busy.

In closing, let me quote from the executive summary of our most recent NLM report. "Based on our collective experience gained during our current NLM contract, we offer the following brief and general conclusions. When carefully designed, implemented, and evaluated, telemedicine consultation provides a clinical experience for providers, patients, and family that is indistinguishable from more traditional face-to-face

encounters.

"Actually doing telemedicine is difficult. The least of these difficulties is technology. Education, support, and training of providers are critical. The need to recognize and mitigate political and social factors that stand in the way of success is often ignored at considerable peril.

"The incentives needed for full participation and evaluation of telemedicine are not yet present, particularly in the area of payment for service. We find ourselves in a no job without experience and no experience without a job situation, and previous federal initiatives to gain necessary experience such as the HCFA waiver program have been ill-designed and executed and created, we believe, the false impression that telemedicine doesn't work.

"Under the leadership of the NLM and with the assistance from entities such as the Institute of Medicine, a more accurate picture of telemedicine is emerging. Considerable economic value is available to patients and their families by the improved access to specialty services and avoidance of costs associated with travel. When considered in the context of the clinical effectiveness of tele-health services, the case for telemedicine is even more compelling from the patient perspective.

"For providers of specialty health care service,

the value proposition is less clear and may vary considerably from one clinical application to the next. Given the lack of routine reimbursement for tele-health services and the lion's share of easily demonstrable economic value going to patients and their families, benefits for telemedicine service providers in the current environment are less direct and must be viewed from a broader health system perspective.

"This perspective must take into account the favorable impact telemedicine programs may have on referral and other relationships. The extent to which telemedicine is viewed is one of several tools for clinical relationship building, and patient care will determine whether decision makers continue to support telemedicine programs when external funds terminate or are otherwise unavailable.

"Given the results of our current and past projects and others, we believe that telemedicine is safe and effective and should be made available to patients and reimbursed on the same basis as traditional health care service. While the federal government has taken a few halting steps in endorsing this position, much more leadership is needed to put telemedicine on an appropriate footing in the health care system."

Thank you for the opportunity to participate in today's events, and I look forward to questions that might

arise.

(Applause.)

MS. BOYLE: Thank you, and are there questions from the panel?

MR. McLEAN: First of all, I have a point of personal privilege. I just wanted to thank Commissioner Boyle for her very kind words. And I'm like many Nebraska Democrats who may not have been in public service if it weren't for the encouragement and example of the Boyle and the Howell [phonetic] families, and I thank you for that.

At the Rural Utilities Service we have an absolutely wonderful program called Distance Learning Telemedicine. We provide grants and loans and loan-grant combinations. We financed over 300 distance learning for telemedicine projects across this country. We've done ten in Nebraska and about three or four in Iowa, and we are presently scoring our grant applications right now.

I have absolutely no difficulty moving our grant money. They are very easy to do, a lot of competition, a lot of interest in the grant funding. But out of $200 million of treasury rate of interest loan funds available right now, available on a first-come, first-served basis -- if we can even get the right project we'll put in $1 of grant funds for every $10 of loan funds to finance end user telemedicine equipment, transmission where it's not

otherwise available or affordable, vehicles and structures to house the telecommunications equipment at treasury rates of interest for ten years or the life of the equipment.

We're only starting to see some interest in that loan product right now, and it's from hospitals that see the value of avoided cost but they have a hard time coming up with the stream of revenues that you had just mentioned in your presentations in order to be able to pay back a loan.

I really need your help. Can you give me any advice on how we can make a loan product -- which we think loan products are actually inherently more sustainable because people are taking on long-term commitments and it's a project that won't end once the financing -- once the grant ends, and finding a way to leverage that with the e-rate discounts.

Can you give me any advice on how we can make that loan product more attractive?

DR. KIENZLE: One of my responsibilities is director of continuing education, and we struggle as we move from a traditional life-long learning model of coming to a place -- a university to obtain continuing education to one in which the product is delivered at the site of work or in the hospital environment or in the school environment, and we're struggling with how you make that transfer and how you provide enough exchange of funds to make the capital

investments and all of that sort of thing possible.

I think that a loan that is linked perhaps to some sort of a collaborative subscription system for life-long learning -- I have a lot of interest in using some of the technology that we have to support K12 interest in health science. A lot of rural science teachers in particular could use all the support they can get, and even some of our medical students have provided outreach programming.

And having the telecommunications infrastructure to do that means that our students, for instance, that go out and do demonstrations for students no longer have to limit their visits to one hour away from the university. They can -- and I've done programming with high school students where students are 300 miles in all directions. And so I agree, it will be important to get some additional dollars into the system so that -- but we need to also have people acknowledge the economic value of having those products delivered directly to their community.

MS. HAMMACK: There are also some instances -- and they are rather select yet -- where people are beginning to recognize that if we want to keep these systems we have to put in some dollars in order to support them.

Last year in Nebraska we did pass LB 559, which is the Medicaid development fund -- excuse me -- bill, and

now it's Medicaid Development Act, I guess -- essentially it does have a piece in there for transmission costs. There are other states that now are looking at facility fees. There is actually a federal bill being drafted that we are very interested in right now, because a component that is in there presently is for a facility fee to the originating sites.

Those kinds of things to help support our systems are absolutely essential, because if we expect hospitals to do this for free and the physicians are not employed there and they're the only ones that are getting paid for the services, they're just going to fail.

The other thing I think is looking at the various things that can happen over the network, things that he was just talking about as far as the medical education components are very important. There are other sites that have looked at things, if they're not excluded. I understand that there is some pricing that is allowed now by [indiscernible] if hospitals would want to, so to speak, sell off some of the time when they're not using this that there would be a way of developing a business plan that would help to support those systems.

I don't know that that's being talked about very openly or promoted, but perhaps that tele-village concept is something that may be helpful to small communities.

DR. BENSCHOTER: Having searched high and low for grants and other support -- I did read the materials on the loan program. First, it's somewhat difficult for a state agency to take out a loan. Secondly, our partners, small hospitals, are having so many financial problems now that tying themselves to shared loan is not too appealing either, so it's a tough thing.

I was not aware that you might -- there was the possibility of shared use of systems, which might very well be the answer.

MR. McLEAN: The results are absolutely remarkable. In some cases, the telemedicine -- in many cases telemedicine is better than the medicine in person. You have digital resolution on the scopes -- and it becomes a community resource. That's the other thing that we see. Once you have that telemedicine facility or distance learning faculty, it's not just important for the whole hospital, it's for the community. The Girl Scouts use it. The Garden Club uses it. The fire department uses it to get emergency medical training.

And we're open for business and we're ready to make loans, and the next year in the November to March time frame, assuming Congress is good to us as they have been in previous years with this program, we will be having our grant application cycle open again.

But the loan money is available on a first-come, first-served basis, as well as the loan-grant combination, so if anybody has any ideas -- another opportunity might be for community organizations to do this as a community service, whether it might be your electric coop or your local telecommunications company to take out the loan in order to bring the service to the hospital or to the clinic.

SENATOR KERREY: Donna, can I talk to you specifically about some of the problems that you face in Kearney? I presume you've got -- are you using GTE or ALLTEL? You've got GTE in there as your I-LEC, and you've got --

MS. HAMMACK: We now have ALLTEL, who is acting as an umbrella and working with the local telco, so we now are with ALLTEL. We used to be with AT&T and we switched from AT&T because they were a non-ETC, so that that would work better, and now, of course, AT&T would be eligible but we're fine where we are presently and we have a system that we are pleased with as far as the service delivery is concerned.

SENATOR KERREY: You said it's critical to have access to broadband. One of the things we've been -- as I've indicated earlier we've been struggling to do is try to find out who does and who doesn't; what sort of access is there. As I see it, it does become very critical if you

consider the need especially to run video through that line.

If you take four minutes of compressed video, you've got ten megabytes of data that you've got to run through the line. That's compressed. But you don't want to compress it if you want the higher resolution. Multiply that by ten. Let's just start off with ten megabytes through a 28.8 kilobyte line. That's a per second line. That's 46 minutes. Even all the way down to 1-1/2 megabytes is 52 seconds. You've got to get down to four megabyte a second coaxial before you drop the time to 20 seconds. You get significant delays in transmitting.

And again, the Chairman and I were at Bayard earlier and they were celebrating 56 kilobit per second, which completely means that streaming video is inaccessible for real time education. It means they absolutely don't get access to it. They can't use it. It's not relevant to them in their education, whereas it's relevant in lots of other communities.

Is that the kind of barrier that you're looking at? Do you find significant barriers -- even in the T1 you must have barriers?

MS. HAMMACK: The T1 works well for us right now. I know that there are educational systems that actually are putting in DS3 at this point. The T1 is fine for us. One of the problems is though when you work with a -- if you're

familiar with Bassett, Nebraska, a community like that -- I'm not sure that they ever had a T1 line going to Bassett, Nebraska before. It truly was an event for that to happen, and our folks at ALLTEL worked with the local telephone company in order to get that accomplished.

But if you were to purely look at the process of posting on the Internet and waiting for someone to respond, and you're expecting to develop this whole consortium of service, that's very difficult to do. Frankly, we had to go out and actively pursue this to make sure that we could get -- ALLTEL worked with these local providers in order to provide an umbrella of service, and that took a little bit of doing to get that accomplished.

So it was not just a simple act of posting on the Internet, and we had lots of people respond. We had no one respond, quite frankly.

We had no one respond, so we had to go out and organize the system, so to speak, to make it work.

SENATOR KERREY: And when you -- when you're dealing with either AT&T or ALLTEL, you basically get one bid on line charge?

MS. HAMMACK: Right now we have one bid. Yes, through ALLTEL, and it's done in umbrella fashion.

SENATOR KERREY: So you don't have competition for your business right now?

MS. HAMMACK: We don't have competition for our business.

SENATOR KERREY: Is that -- does that create any difficulties for you at all?

MS. HAMMACK: At some point I suppose that could. Yes.

SENATOR KERREY: Should we ask ALLTEL to leave the room so you can answer?

(General laughter.)

MS. HAMMACK: We work very well with them right now.

SENATOR KERREY: Was it a problem with AT&T?

MS. HAMMACK: Let's say they were not perhaps as flexible in working with a larger company. And for example, this is -- it's a real life problem. Right now we have not yet received one cent of subsidy for year two.

SENATOR KERREY: On the e-rate? Are you talking about --

MS. HAMMACK: Right. Yes. The rural health care side. And part of it is we're no longer working with one carrier but we need two months of documentation from them, so we just need to work through the process. And it will happen but it's just -- it's more cumbersome. It's another step to go through. And then when we get that solved then we can work with ALLTEL and get the other ten

months accomplished.

SENATOR KERREY: Is interstate licensing an issue for you?

MS. HAMMACK: Interstate licensing -- it's a very cumbersome issue. Right now our physicians who provide service regularly in Kansas -- we need to license them. And having been a person who's helped get this facilitated for physicians, it is extremely cumbersome. We do it because that's what needs to happen to do business.

I think that it really inhibits some people from crossing state lines, most definitely.

SENATOR KERREY: Thanks.

CHAIRMAN KENNARD: For those of you who aren't familiar with the Rural Health Care program that we're talking about, this was a provision that was again sponsored by Senator Kerrey, the same amendment that resulted in the e-rate that allows the FCC to administer a program that gives rural health care facilities access to the same high-speed networks that people are able to access in urban areas, and it's basically a subsidy program that subsidizes the difference between what people pay for connectivity in urban areas and rural areas.

And the program, just to be candid, has been a real for a couple of reasons. One is it was very -- as soon as we went to implement the program a lot of people attacked

it just like the e-rate and didn't want it to go forward. And thankfully, Senator Kerrey and Senators Rockefeller and Snowe and others that sponsored the amendment rallied again and got us going.

But there's been some frustration expressed about the application process and how cumbersome it's been, and I apologize for that. But please understand that that was a necessity in order to get the program going, because before we were able to give out one cent of discount money in both these programs, we had to undergo three audits directed by people in Congress who wanted to shut it down, and basically, they were looking for any evidence of fraud or misappropriated funds as an excuse to shut the program down.

Now we're going into the third program year and we've proven that the programs work and that they are delivering very needed benefits around the country, and so we've moving to relax some of the application processes.

And I'm glad, Donna, that you mentioned that some of these -- you're seeing some benefits of those working.

But we still need to find -- I don't think we've really hit our stride with rural health care. I think we're still struggling to find ways to make it most useful for people in rural America, and so if you have any suggestions or ideas on how we can structure the program so it better serves your needs, now's your chance, because we have -- as